

NDS8963

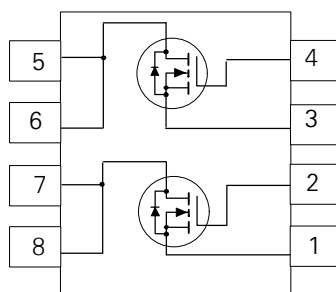
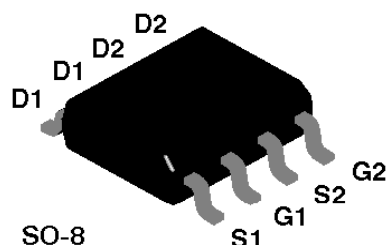
Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

SO-8 N-Channel enhancement mode power field effect transistors are produced using National's proprietary, high cell density, DMOS technology. This very high density process is especially tailored to minimize on-state resistance and provide superior switching performance. These devices are particularly suited for low voltage applications such as DC motor control and DC/DC conversion where fast switching, low in-line power loss, and resistance to transients are needed.

Features

- 2.5A, 30V. $R_{DS(ON)} = 0.16\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} = 0.25\Omega @ V_{GS} = 4.5V.$
- High density cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability in a widely used surface mount package.
- Dual MOSFET in surface mount package.



Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise note

Symbol	Parameter	NDS8963	Units
V_{DSS}	Drain-Source Voltage	30	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous (Note 1a)	2.5	A
	- Pulsed	7.5	
P_D	Power Dissipation for Dual Operation	2	W
	Power Dissipation for Single Operation (Note 1a)	1.6	
	(Note 1b)	1	
	(Note 1c)	0.9	
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	78	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	40	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$			1	μA
				$T_J = 55^\circ\text{C}$	10	μA
I_{GSSF}	Gate - Body Leakage, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate - Body Leakage, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
ON CHARACTERISTICS (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1		3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$			0.16	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 2\text{ A}$			0.25	
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}, V_{DS} = 5\text{ V}$	7.5			A
		$V_{GS} = 4.5\text{ V}, V_{DS} = 5\text{ V}$	3			
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I_S	Maximum Continuous Drain-Source Diode Forward Current				1.3	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 1.3\text{ A}$ (Note 2)			1.2	V

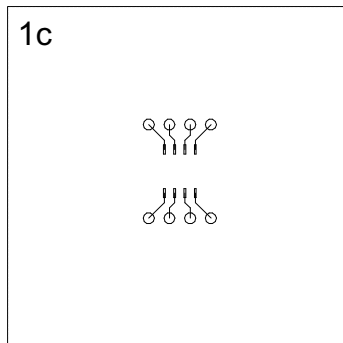
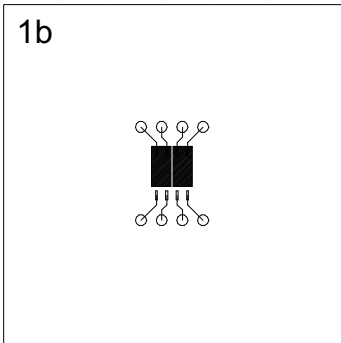
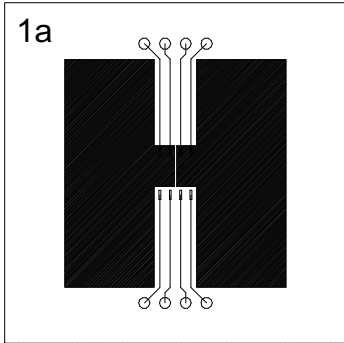
Notes:

- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.

$$P_D(t) = \frac{T_J - T_A}{R_{\theta JA}(t)} = \frac{T_J - T_A}{R_{\theta JC} + R_{\theta CA}(t)} = I_D^2(t) \times R_{DS(ON)}@T_J$$

Typical $R_{\theta JA}$ for single device operation using the board layouts shown below on 4.5"x5" FR-4 PCB in a still air environment:

- 78°C/W when mounted on a 0.5 in² pad of 2oz copper.
- 125°C/W when mounted on a 0.02 in² pad of 2oz copper.
- 135°C/W when mounted on a 0.003 in² pad of 2oz copper.



Scale 1 : 1 on letter size paper.

- Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.